REMARKS

The specification has been amended to correct a listing of prior art references in the Table on pages 5-6. No new matter is added by virtue of this amendment. Indeed, the correction is amply supported by the same Table appearing on page 6 in the earliest filed German priority document, DE 103 16 987.3, filed April 11, 2003. For convenient reference, a copy of that priority document is attached in Appendix 1 which follows these remarks.

Claims 1-3 are withdrawn as being drawn to non-elected subject matter. Claims 4-15 are under examination. Of those claims, claim 4 has been amended to incorporate the feature of claim 11 (now cancelled). No new matter is presented by virtue of the within amendments; support therefore is found throughout the specification and in the original claims of the application.

As an initial matter, it is believed the amendments may be properly entered at this time, i.e. after final rejection, pursuant to 37 CFR §1.116, because the amendments do not require a new search or raise any new issues, and they reduce issues for appeal. Indeed, it is respectfully submitted that the within amendments place the application in condition for allowance. Thus, entry of the amendments at this time is earnestly solicited.

Claim Rejections under 35 USC §103

For the sake of brevity, the following rejections are discussed in combination.

Claim 4 stands rejected under 35 USC §103(a) over Link et al. (US 4,798,914).

Claims 4-15 stand rejected under 35 USC §103(a) over Link et al. in view of Dummer et al. (US 4,822,932).

At the outset, it is noted that EP 0 264 065 (also to Link et al.) claims common priority with Link et al. (US 4,798,914). Accordingly, while various points of discussion below mention EP 0 264 065, the remarks are likewise germane to the counterpart U.S. patent, Link et al. (US 4,798,914).

In any case, the rejections are traversed. The cited documents, even in combination, do not teach or suggest the features of the present invention and are insufficient to sustain the §103 rejections.

Independent claim 4 recites a process for the production of vinyl chloride by thermal cracking of 1,2-dichloroethane in a cracking furnace in which a medium pressure of from 1.4 to 2.5 MPa is maintained in the system. Further, an externally heatable and separately regulatable heat exchanger is provided. This externally heatable and adjustable heat exchanger is a key feature of the present invention and is required to prevent pressure and temperature fluctuation in the system.

Link et al. (US 4,798,914) is directed to a process for the production of vinyl chloride by thermal cracking of 1,2-dichloroethane wherein the thermal energy of the cracking gas (i.e. the gas leaving the cracking furnace) is utilized to heat liquid 1,2-dichloroethane in a heat exchanger. The heat exchanger according to Link et al. corresponds to the EDC vaporizer 4 as shown in Figure 1, Sheet A, of the present application. The heat exchanger used according to Link et al. is not externally heatable and separately regulatable. Therefore, pressure and temperature fluctuations in the system according to Link et al. cannot be prevented. The only way pressure and temperature fluctuations in the apparatus according to Link can be influenced is by the heat input with the burners. The heat exchanger used by Link is used to warm up and evaporate the EDC (i.e. as a vaporizer).

In contrast to this, according to the present invention, pressure and temperature fluctuations in the system can be prevented by using an externally heatable and separately regulatable heat exchanger.

In that regard, Applicant has noted an inadvertent error in the Table appearing on pages 5 to 6 of the present application (WO 2004/089860). In line 1 of the Table, the two prior art documents have been interchanged in columns 3 and 4. In particular, reference is made to the copy of the earliest German priority document (DE 103 16 987.3, filed April 11, 2003), a copy of which is attached as Appendix 1 hereto. As shown in the German priority document, the third column provides comparative data for

EP 0 264 065 (not DE 34 40 685) and the fourth column provides comparative data for DE 34 40 685 (not EP 0 264 065). The Specification has been amended to reflect that correction.

With that correction in mind, it can be clearly seen from this Table that the formation of by-products is significantly lower in the process according to the present invention when compared with Link (EP 0 264 065 / US 4,798,914). This results in a higher yield of 1,2-dichloroethane. Most significantly, the furnace operating time between cleaning periods is nearly twice as high for the process according to the present invention when compared with the process according to Link. Applicant submits that cleaning of the furnace takes up to two weeks and therefore, the furnace operating time has a significant influence on the output and productivity of the process. (For example, Applicant submits that two weeks of time corresponds to a loss of productivity of approximately 2.5%). Applicant also submits that in total 35 million tons of vinyl chloride are produced every year. Therefore, in the production of a product in such a large scale, an increase in the productivity of only a few percent still has a large influence on the overall costs of the final product.

Further, a principle objective of the present invention was to improve upon the process of Link et al. In particular, it was a central object of the present invention to provide a process in which the economic efficiency is improved, i.e. in which the formation of by-products is significantly reduced over the process according to Link. As shown in the enclosed Table, this objective is clearly solved by Applicant's process.

Regarding the process described in DE 34 40 685 (also to Dummer et al.), i.e. the low-pressure process, it can be clearly seen from the Table that this process has a significant higher energy consumption than the process according to the present invention. In that regard, Applicant submits that the process according to DE 34 40 685 does not use an EDC evaporator heated by cracking gases.

Therefore, in order to compare the total energy consumption of EDC-cracking with the energy consumption of the present invention as well as the process according to Link, it is noted that in the case of DE 34 40 685, the energy consumption of EDC-

vaporization has to be added to the total energy consumption of EDC-cracking. In the process according to the present invention as well as the process according to Link et al., the energy consumption of EDC-vaporization does not have to be added to the total energy consumption of EDC-cracking due to a heat exchanger used as an EDC-vaporizer.

Therefore, the actual total energy consumption of the EDC-cracking including the energy consumption of EDC-vaporization in kW/t is 904 in the process according to the present invention, 890 in the process according to Link et al. and 1178 according to DE 34 40 685. Therefore, the energy consumption is 30% higher in the process according to DE 34 40 685 when compared to the process according to the present invention.

In addition to the total energy consumption indicated above, also the refrigeration output for liquefying the hydrogen chloride at the top of the HCl column is much lower in the process according to the present invention than in the process according to DE 34 40 685. Applicant also points to the fact that as energy for liquefying the hydrogen chloride, electricity has to be used which additionally involves much higher costs for energy.

In sum, as stated in the present application at page 6, line 28, to page 7, line 4, the tabular presentation strikingly shows that the method according to the present invention makes it possible to obtain the decisive advantages of low-pressure-cracking, a high yield, a low rate of by-product formation and a long operating time of the furnace combined with a low-energy consumption that bears comparison with high-pressure cracking.

In order to further demonstrate the advantages of the present invention over the cited art, reference is made to Appendix 2 which includes an Attachment to the Evaluation of the test results.

This Table shows the cost advantage associated with the present invention when compared to the processes of the prior art. The costs associated with the process of the present invention are 0.2 €/ton lower than for the process according to Link and 18.8 €/ton lower than for the process of DE 34 40 685.

Taking into consideration an annual production of 35 Mio. tons of VCM, this leads to an advantage of 7 Mio. € over Link and 658 Mio € over DE 34 40 685. (Applicant also notes that the costs associated with the larger furnace operating time compared to Link are not included in these costs.)

Not only can Dummer et al. (US 4,822,932) not remedy the deficiencies of Link et al., Dummer has no relevance to the present invention. Dummer et al. does not deal with the cracking process itself; rather, it relates to the technology after the quench column. Therefore, Dummer et al. deals with a completely different aspect of the technology, quite distinct from the present invention. Applicant submits that one skilled in the art would have no reason to refer to Dummer et al. when trying to optimize the process according to Link et al. Beyond that, even if one of skill in the art were to combine Dummer with Link, the result would not be the present invention.

As can be seen from the Example in the present application at page 7, the process according to the present invention preferably also uses an EDC vaporizer analogous to the heat exchanger disclosed in Link et al. As mentioned above, this heat exchanger is only used to bring the EDC into the gaseous form. In that regard, in order to further clarify the features of the invention, claim 4 has been amended and now incorporates the subject matter of original claim 11 (now cancelled), i.e. that the EDC is introduced into the cracking furnace in gaseous form. This gaseous form implicates the use of an EDC vaporizer and further distinguishes the present invention from the cited art.

Accordingly, the rejections are properly withdrawn. For example, it is well-known that to establish a *prima facie* case of obviousness, three basic criteria must be met: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) there must be a reasonable expectation of success; and (3) the prior art reference(s) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based

on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143.

There is no suggestion or motivation, either in the cited reference(s) or in the knowledge generally available to one of ordinary skill in the art, to modify the cited reference(s) to make the claimed invention, nor is there a reasonable expectation of success.

Still further, the superiority of the present invention further rebuts any *prima facie* case of obviousness asserted.

In view of the above amendments and remarks, Applicant believes the pending application is in condition for allowance.

FEE AUTHORIZATION

Should any fees associated with the submission be required, the Commissioner is authorized to charge the missing fee to our Deposit Account, No. 04-1105, with reference to 64223(52059). Any overpayments should be credited to said Deposit Account.

Respectfully submitted,

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An **Appendix** follows:

Appendix 1: Earliest German priority document: DE 103 16 987.3, annotated at page 6

Appendix 2: Attachment to Evaluation of test results